

BEYOND THE SLAUGHTERHOUSE

Producing real meat without killing animals.

BY KAREN DAWN

"If the new meat being grown is called 'cell-based' or 'cultured,' shouldn't traditional meat be labeled 'slaughtered?' "

The question from the audience got a good laugh and prompted a fun jab back from panel moderator Ezra Klein, who called us a "roomful of hippies."

That was last year, in Berkeley. This year's Good Food Conference, held in early September, was across the bay at San Francisco's five-star Palace hotel. When I tried to book a room, prices were more than \$600 per night. Winky Smalls and I opted for the nearby Kimpton, known to give five-star service to fur-kids.

The Good Food Conference is put on by the Good Food Institute, a nonprofit group that supports companies trying to replace animal agriculture with truly sustainable meat, dairy, eggs, and seafood production that doesn't involve killing billions of animals per year.

Though the meat industry's dire effect on our planet final-

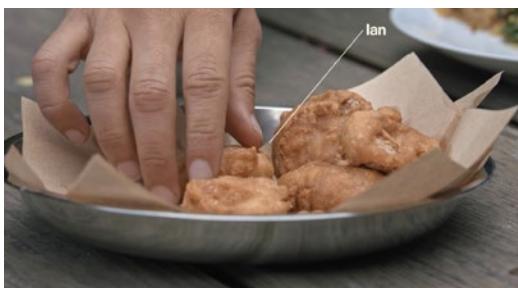
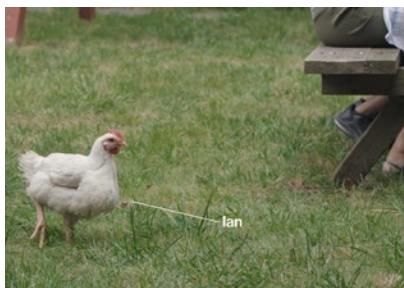
ly got some attention after the release of the 2014 documentary film *Cowspiracy: The Sustainability Secret*, the mainstream media have largely failed to catch on. Only as the Amazon burns have more outlets picked up on the issue, noting that the fires were started by cattle ranchers clearing land, and by soybean farmers growing crops to feed cattle.

Some people, aware of livestock's contribution to climate change, are moving toward eating "only fish." As whales wash up on beaches with plastic in their stomachs, we ban plastic bags and plastic straws but try to avoid noticing that the animals' stomachs are empty of all but the plastic garbage. Scientists suggest the plastic leaves no room for food.

But even with no plastic in sight, animals that live in our oceans are starving. In a colony of almost 40,000 penguins in Antarctica, all but two chicks starved to death in 2017.

A "clean" meatball produced by Memphis Meats





Video stills from JUST Inc.'s promotional video show picnickers eating cell-based meat grown from the feathers of Ian, the chicken who strolls by the picnickers' feet.

When the explorer Captain John Smith arrived in North America, he saw striped bass so plentiful he mused he could walk across the water "dry-shod" on their backs. Folk lore is similar for spawning Atlantic salmon. That is now hard to imagine, as industrial fishing empties the oceans. Sadly, whales, dolphins, seals, and penguins—unlike us—can't switch to pasta or tofu.

Last year in Berkeley, the conference buzzed about the incredibly meat-like Beyond and Impossible Burgers that were just hitting the market. That Berkeley buzz became a Wall Street cacophony a few months later in May 2019, when Beyond Meat went public and became the "biggest popping U.S. IPO" in almost two decades.

This year, the buzz at the conference was about cell-grown meat. Or cultured meat. Or clean meat. Or even microbrewed meat.

Before we talk about what to call it, let's take a quick look at what it is. Though it may sound like science fiction, it's actually rather like the now common process of growing human skin for burn victims.

As explained at the conference, it begins with taking some cells from an animal.

"Doesn't that hurt the animal?" asked an audience member.

"Not as much as the way we're making meat now," shot back Kris Chatrathi of Black & Veatch, an engineering firm that has taken an interest in cell-based meats.

As of now, the nascent industry has no set standard

"Herbivorous animals use plants as their media to produce meat, and so can we."

as to how the base cells are obtained. JUST Inc., a San Francisco-based food manufacturer, has a promotional video that shows its researchers using a discarded chicken feather to grow nuggets. The donor's name is Ian.

One is reminded of the episode of the IFC series *Portlandia*, in which a couple ask about the chicken on the menu. They learn that his name was Colin, and are handed his papers to look over.

But Ian is still alive, so this may be more like one of my favorite Instagram memes where we see the heading, "Let's have chicken for dinner." There's a photo of a family sitting around a table eating a vegetarian meal. A chicken sits with them, saying, "Thanks for inviting me!"

The video by JUST Inc. combines the two: Ian wanders around in full-bodied wellness near picnickers who are eating fried up chunks of, well, him.

A scientist at a competing company, which is apparently not working with feathers, has asked me if I would be willing to subject any of my rescued turkeys to a painless biopsy from which the company's scientists could grow cells. They want to be able to show that their meat comes from cells that come from an animal who is having a beautiful life.

The answer is yes!

Whether obtained from a feather, swab, or small biopsy, the cells are added to a medium, which is basically cell food, in specialized vats known as bioreactors, where they begin to replicate. In the early research, that medium was animal-based, which gave

some animal advocates pause, but things have progressed. JUST's co-founder and chief executive officer, Josh Tetrick, tells me in a phone interview, "Herbivorous animals use plants as their media to produce meat, and so can we."

The replicating cells are put on scaffolding where they grow into the final product. It looks and tastes like meat—because that's what it is.

DURING THE CONFERENCE, I sat down with Joe Barry, who spent two decades in the canned tuna industry working for companies like Chicken of the Sea and Bumble Bee Foods. Barry was attending as an investor in BlueNalu, a San Diego-based company dedicated to making cell-grown fish.

"Just like the beef industry kills beef, our industry kills fish," Barry told me. "We harvest them and butcher them and bring them into canneries. But if the end result is to have fish in a can, or fish on a plate in a restaurant, and you can do that without continuing to kill the fish, well that's a better way to that result."

He expressed concern about the bycatch—"the unintentional kills of a lot of different species"—that comes with traditional fishing, especially industrial fishing.

We talked about the massive industrial fishing boats that leave no fish for indigenous peoples or others who fish traditionally for their livelihood. And we talked about an article in *The New York Times* that documented slave labor in Asia on fishing boats that catch fish used to feed pets and livestock in the United States. I soon understood why he saw "no downside" in replacing the industrial fishing industry with bioreactors and scaffolding.

Rather than hurting small-scale fishing efforts, Barry expects the new cell-grown fish to interfere with the cattle industry. He says the amount of fish and shellfish that the average American eats each year is increasing. According to 2016 figures from the U.S. Department of Agriculture, Americans ate almost fifteen pounds of sea animals per capita, compared to almost 108 pounds of chicken and turkey and almost 107 pounds of cattle and pigs. If people move entirely from land animals to wild-caught fish, we will empty the oceans in no time. And if everybody transitions to farmed fish, the cruelty would be unimaginable.

In August, *Time* magazine ran an article about one scientist's quest to start farming octopuses. It notes that the animals are smart enough to realize that their own reflections are not other octopuses in their tanks; they can use mirrors to turn on prey behind them. Octopuses in close quarters cannibalize each other, so farming them successfully would probably mean putting them in individual cages, recreating

"We have to think about what we are going to have left to leave our children and grandchildren, and what we won't have if we don't start making conscious choices."

the horror we have designed for pigs. We can only hope BlueNalu, or somebody, gets to market with cell-grown octopus meat before the protagonist in *Time*'s article opens an octopus farm.

Fish, too, are intelligent. They use tools and recognize distinct human faces. Their experiences have been shown to shape their personalities, and some are playful with divers. As human society begins to seriously consider the ethics of factory farms for land animals, replacing them with similar farms for fish makes no ethical sense.

Ethics aren't the only issue. Sandhya Sriram is chief executive officer and co-founder of Shiok Meats, based in Singapore. During the panel titled "New Wave Sustainable Seafood," she told us that shrimp on farms are currently raised in sewage water, bleach, and antibiotics. Her company is looking to bring clean and healthy meat and seafood to Singapore and Southeast Asia. "We want to move to a world where not everybody is eating sewage water," she said. Good goal.

Lou Cooperhouse, the co-founder and chief executive officer of BlueNalu, explains that cell-grown fish will be incomparably cleaner and safer, as he enumerates with apparent relish some of the toxins currently found in fish: "mercury, PCBs, sea lice, and other parasites," for starters. And he tells me the industry is rife with so much fraud that much of the time you aren't actually eating what's on the label.

Cooperhouse has more than three decades of experience in the mainstream food industry but sees cell-grown fish as the business opportunity of a lifetime. He expects not only to replace the fishing industry but to improve on it significantly.

"Currently, restaurants design their menus and advertise the price of fish dishes according to availability," he says. "We will be able to give chefs a constant supply of whatever fish they want, already filleted and completely free of bones." And presumably, free of heads, eyes, and scales.

Cooperhouse's passion turns solemn as he talks about our need "to change the world": "We have to think about what we are going to have left to leave our children and grandchildren, and what we won't have if we don't start making conscious choices."

THIS BRAVE NEW INDUSTRY is still figuring out what the new meat should be called. Last year, the favored term was "clean meat," a nod mostly to its environmental benefits. That term also addresses health issues: When billions of animals are raised in their own feces on factory farms and then slaughtered at rates of more than 1,000 per hour (with a much higher rate for chickens) the pathogen spread

can be deadly. Millions of people are sickened and hundreds die from salmonella and E. coli poisoning every year in the United States, so while some consumers may have questions about the safety of the new meat, it is likely to be far safer than traditional meat, and that's because it is, indeed, "clean."

Market research done by the Good Food Institute, however, has shown that consumers also like the terms "cultivated" or "cultured" meat.

Tetrick, of JUST Inc., thinks that the term used will matter because it will impact whether or not people—at least those from his hometown in Alabama—are willing to buy the product.

At first appearance, nobody could seem further than Tetrick from the "hippies" Ezra Klein joked about. He presents as an all-American football player. In fact, Tetrick did grow up playing football, but his best football buddy, Josh Balk, took a path that led from football to the Humane Society of the United States, embracing values that rubbed off on Tetrick. Together, they founded Hampton Creek, which later became JUST.

Although the company has raised more than \$220 million from investors and is now valued at \$1.1 billion, it is mission driven. Both of the founding friends have told me they share a San Francisco apartment when Balk is in town, and put everything they earn into a trust, the purpose of which is to fund food system change for the sake of animals, the planet, and our future.

Tetrick doesn't want the new meat to have a prefix. Just as his smartphone is now just his phone, he expects that in the not-too-distant future, meat grown from cells will just be called meat.

That's one of the reasons JUST is working on cell-grown rather than plant-based meat, even after having extraordinary success with plant-based JUST Mayo and plant-based liquid eggs that went into Walmart during the week of the conference. Tetrick wants meat that does not come from killing to be the only meat on store shelves in a decade or so, and thinks that is most likely to happen if it is just called meat. And he says our best bet for that is if it's grown from animal cells. In his words, "The highest probability for getting conventional meat off is to put cultured on."

At the conference, Tetrick sparred cheerfully with cardiologist Uma Valeti, the chief executive officer and co-founder of Memphis Meats, during a panel titled "Cell-Based Meat Entrepreneurship."

Memphis Meats was one of the first start-ups to produce "cell-based meat," and while Tetrick has called that particular term "confusing and unappetizing," Valeti likes it, even though he admits it "sounds a little sciency." He says, "People out there don't particularly

want to kill an animal, they just don't want to give up a product they love deeply. So we should be proud of what we are doing and willing to talk about it honestly."

In March of this year, the USDA and the Food and Drug Administration issued a formal agreement on their plans for joint oversight of the industry. That paves the way, providing assurances of safety to consumers. Companies have already created edible—and apparently delicious—cultured meat, so it could be available almost immediately. A stumbling point is the price of production. Meanwhile, the traditional meat industry gets billions in government subsidies despite its immense cost to society.

Marie Gibbons, a research scientist at Memphis Meats, tells me her company has already grown duck meat. It occurs to me that if they grew foie gras (fatty liver from ducks or geese) they would bypass both the California ban on the practice of force-feeding birds to make the product and a similar ban that has been proposed for New York City.

Fancy restaurants have flouted California's ban on the sale of foie gras by providing it free as part of tasting menus. Since it is eaten as a status symbol, serving cell-grown legal foie gras at exorbitant prices would surely make interest in the original product look crass and cheap.

Why wait until the new meat can be created at low cost, large scale? The flat screen television I bought for \$1,000 now sells, ten years later, for a couple of hundred dollars. Cultured foie gras, Kobe beef, and bluefin tuna could take similar paths.

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TRYING TO LOOK at the new industry from every angle, I asked Tetrick if he worries about it putting farmers, like those he grew up with in Alabama, out of business. He says the farmers he knows are "smart and flexible" enough to be able to change what they grow in order to supply brand new markets.

For example, JUST makes those plant-based eggs that just got picked up by Walmart from mung beans. Though that process takes fewer plants than it does to make eggs by feeding plants to chickens, Tetrick is still going to need a lot of mung beans. From farmers. And though a few cells from an animal can make millions of pounds of meat, the plant-based nutrients that feed those cells will also come from farms.

"Farmers aren't just farmers," Tetrick adds. "They are also dads and moms, who want to bring their kids up in a world where they can breathe the air and drink the water."

A new meat industry that makes the same product via a different method will help make that possible. Surprisingly soon, we will be able to have our steak and eat it too. ♦